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the electric theory; waves, especially sound waves; the physical theory of hearing and musical instruments; and valuable chapters on Elementary Theory of Optical Instruments, Spectroscopy, and Maximum Efficiency of Optical Instruments.

The Plankton of the Limfiord.[1] — This fiord is a tortuous channel, 92 miles in length, which traverses the peninsula of Jutland. In 1825 an irruption of the North Sea drove back the fresh and brackish water fauna of the fiord and replaced it with that of the sea. A slow current passes through it from the east or the west according to the relative levels of the North and Baltic Seas, though in recent years it has been predominantly from the North Sea eastward. The stream is shallow — 2–13 fathoms — with a few expansions in shallow lakes, and exhibits practically uniform conditions of temperature and salinity at the top and the bottom. Owing to the slight depth the temperature rises to 18.4° C. in the summer, and the salinity averages about 3 per cent. The plankton of this interesting region has been investigated by Dr. Petersen of the Danish Biological Station. Three traverses of the fiord were made in 1896 and 1897, and the collections thus made were supplemented by a seasonal series and by others from the Cattegat and the Baltic. The qualitative examination, made by Mr. H. Grau, was confined in the main to the diatoms and the Peridinieæ, which constitute the bulk of the plankton. The investigation determined that the amount of plankton per □ meter in the shallow fiord was 10–50 times as great as that of the adjacent and deeper North Sea, and more than double that of the Cattegat. The constitution of the plankton is peculiar in that the predominant species are neritic rather than oceanic, and are not thus abundant in the North Sea, whence the fiord receives its water, nor in the Cattegat, into which it empties. Its diatom flora must therefore breed in the water in transit in response to some change in the physical-chemical environment, as, for example, contact with the bottom, rise in temperature, or the addition of nitrogen by the tributary rivulets. Another instance of this unique phenomena — namely, the maintenance of a peculiar plankton at a given point in a body of water traversed by a current — was discovered in the Cattegat, where an undercurrent from the deeper Skager Rack enters this shallower area, and there is developed within it, in passing, a local and peculiar diatom flora. The results of this work lead the author to suggest that "guide organisms" from the plankton for the detection of oceanic currents, especially with changing shore conditions, should be chosen with care.

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[1] Petersen, C. G. J. Plankton Studies in the Limfjord, *Rep. Danish Biol. Station*, vol. vii, 1897. 23 pp., with 1 map and 4 tables. 1898.

C. A. K.

PHYSIOLOGY.

Ocular Accommodation. — For several years past Dr. Theodor Beer,[1] of the University of Vienna, has been investigating ocular accommodation in those animals which possess well-developed camera eyes, and has presented in a lecture before the Fourth International Congress of Physiologists an admirable survey of this subject. According to him such water animals as the dibranchiate cephalopods and the bony fishes possess eyes which in the resting condition are accommodated for short distances, and which require active accommodation for vision at long distances. This is brought about by shifting the lens, without changing its curvature, from a distant position to one nearer the retina. In the cephalopods this shifting is accomplished by the contraction of a ring-shaped muscle which works against the deeper contents of the eyeball. In the bony fishes a band-like muscle, the retractor of the lens, draws that body inward toward the retina.

In the air-inhabiting vertebrates the resting eye is accommodated for distant vision. Near vision is possible only by active accommodation. This is accomplished in one of two ways: either the lens, unchanged in form, is moved away from the retina, as in amphibians and most snakes, or the convexity of the outer surface of the lens is increased, as in a few snakes, the turtles, crocodiles, lizards, birds, and mammals. The outward movement of the lens is brought about by an increase of pressure in the vitreous humor, produced by muscular contraction; the change in the convexity of the lens is induced by the well-known indirect action of the ciliary muscle.

In all the groups of animals examined, with the exception of the cephalopods and the birds, some species were found in which accommodation was entirely or almost entirely absent; such, for instance, was the case in the cartilaginous fishes, the sea eels, haddock, frogs, toads, salamanders, alligators, some lizards, vipers, and many rodents. Many of these are night animals, and possess in the daytime so small

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[1] Beer, T. Die Accommodation des Auges in der Thierreihe, *Wiener klinischen Wochenschrift*, Nr. 42, Jahrgang 1898.